

64 *Stability of Structures in regard to Wind-Pressure.*

strength of wrought-iron is taken at 20 tons per square inch.

Breaking Weights of Different Parts.

Bar by tension	...	...	...	60 tons
Bar by shearing of end	...	...	...	75 tons
Bolt by shearing at centre	...	...	...	91 tons
Gusset-plates, shearing by bolt	...	...	...	120 tons
Gusset-plates, shearing by rivets	...	...	...	120 tons
Rivets by shearing	25 tons

In altered Position of Plates.

Rivets by shearing	50 tons
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In the next paper I hope to treat of the wind-pressure upon roofs, in connection with which I have been making experiments.

ART. VIII.—*Descriptions of New, or Little Known, Polyzoa.*

PART XI.

BY P. H. MACGILLIVRAY, M.A., M.R.C.S., F.L.S.

[Read 8th July, 1886.]

Family CATENICELLIDÆ.

Catenicella gemella, n. sp. Plate I., fig 1.

EACH internode consisting of a geminate pair of zoœcia, each pair in the main stem giving origin to two double zoœcia, the one pair continuing the stem directly upwards, the other originating a lateral branch, these branches starting alternately right and left; the lateral branches mostly undivided, but occasionally giving off secondary branches; in the lateral branches, the geminate pairs giving off the next pair alternately from the right and left zoœcium;

mouth large, lofty, straight below. Beneath the mouth a series of 5-7 fenestræ around an area continuous with that of the mouth, depressed at the margin, and slightly bulging centrally; the mouth and fenestrate area encircled by a thick margin; lateral processes large. At each upper angle a small acuminate chitinous process (possibly the mandible of a small avicularium); a minute marginal avicularium at the middle of each lateral process at the extremity of a tube-like mark. A minute sessile avicularium on a slight elevation between the cells; posterior surface umbonate; margin finely sulcate.

Port Phillip Heads, Mr. J. B. Wilson.

This very handsome and remarkable species differs from all hitherto recorded in the constant gemination and peculiar arrangement of the zoecia. The anterior avicularia are very inconspicuous, and not always apparent, and the avicularian nature of the chitinous point on the upper angle of the zoecium is doubtful.

Claviporella, n. genus.

Branches springing usually from the summits of the zoecia of a geminate pair, but occasionally from the sides of single zoecia. Zoecia single or geminate; usually a large lateral process on each side above, supporting a large gaping avicularium, occasionally small, altered, or aborted.

This genus is proposed for the reception of *Catenicella aurita* (Busk), *C. geminata* (Wyv. Thomson), and two other species which are now described. It differs from *Catenicella*, chiefly in the peculiar key-hole form of the mouth, and differs from *Calpidium*, in which the shape of the mouth is somewhat similar, in wanting the overarching oral hood of that genus. There are also several (usually four) blunt processes in the neighbourhood of the mouth. The species are all very small.

C. pulchra, n. sp. Plate I., fig. 2.

Zoarium very small; branches originating either from the summits of geminate zoecia or from the sides of ordinary zoecia. Zoecia vase-shaped, with usually a wide lateral process on each side, turned slightly forwards, and supporting a gaping avicularium; mouth narrow, with the oral sinus very narrow and with a tumid border; two blunt.

mamilliform processes on each side of the mouth; a central, vertically elongated pore, in the front of the zoecium; the rest of the surface papillose, with the papillæ usually larger in the neighbourhood of the central pore; posterior surface smooth.

Port Phillip Heads, Mr. J. B. Wilson.

At once distinguished from the other species by the smaller and narrower zoecia. The oral sinus has a slightly raised border. On each side of the mouth are constantly two blunt, hollow processes. It is the only species in which I have seen the branches originate from the sides of zoecia.

C. imperforata, n. sp. Pl. I., fig. 3.

Zoarium small; branches originating from the upper extremity of each of the cells of a geminate pair. Zoecia, except at a bifurcation, single, broadly vase-shaped; a wide gaping avicularium (frequently differing in size and sometimes wanting) at each upper angle; mouth rather wide, oral sinus small, and with a tumid border; two mamilliform processes on each side of the mouth; front papillose, usually a few of the papillæ towards the centre larger, and probably when worn forming small pores, but there is no proper central pore. Posterior surface smooth. Oœcia galeate tubercular, either surmounting the terminal zoecium of a branch or one in its continuity; in the former case the upper outline rounded, in the latter a wide, gaping avicularium at each upper angle.

Port Phillip Heads.

Closely allied to *C. aurita*, but I think specifically distinct. In *C. aurita* there is always a distinct, large pore in the front of the zoecium, usually (but not always) surrounded by a ring of fenestræ. I have added figures of two forms of *C. aurita*, with only a single central foramen; in one the lateral avicularian process is enormously developed on one side of each zoecium.

Family MEMBRANIPORIDÆ.

Amphiblestrum bursarium, n. sp. Plate II., fig. 2.

Zoarium encrusting. Zoecia quadrate, elongated, rounded above, separated by thick, crenulated margins; about two-thirds of the area filled in by a calcareo-membranous lamina;

aperture hollowed below ; mouth situated at the extreme upper end ; a short, stout, mamilliform process on each side above. Avicularium at the upper part of a special cell, the mandible directed upwards, narrowed below, broad and rounded above, the narrow chitinous band in its margin minutely beaded or crenulated.

Sorrento, Rev. Dr. Porter.

At once distinguished by the membrano-calcareous lamina, the mamilliform process on each side of the mouth, and especially by the peculiar avicularium, the mandible of which shuts down like one side of a clasp-purse. It approaches the genus *Biflustra*.

Family MICROPORIDÆ.

Thairopora Jervoisii, Hincks sp. Pl. II., fig. 1.

(*Steganoporella Jervoisii*, Hincks, *Ann. Nat. Hist.* 1880).

Zoarium encrusting. Zoecia arranged in linear series, more or less quadrate, separated by raised margins; each zoecium traversed by raised lines, of which two usually proceed from each side inwards, the lower inclined obliquely upwards, the upper downwards, each pair meeting about the central line, the points of junction being united by a vertical raised line; mouth very lofty, narrow, hollowed below, on each side a stout mamilliform process directed straight forwards.

Sorrento, Rev. Dr. Porter.

Micropora coriacea, var. *angusta*.

Micropora coriacea is a common species. As found in Australia it differs little from the European form, except in the general absence of the clavate elevations of the margins near the mouth, which, however, are occasionally seen. One variety seems worthy of being distinguished. In it the zoecia are very long and narrow, the margins sharply raised and finely crenulated, the pouting lower lip marked in the same way, the front of the zoecium punctate or finely perforated, but without any large lateral apertures. The oecium does not present the usual knob-like elevation, and the avicularium has the mandible directed obliquely downwards. The whole zoarium is silvery, and frequently only loosely adnate.

Family CRIBRILINIDÆ.

Cribrilina monoceros, Busk, sp.

This is a common and somewhat variable species, and it seems to me that two distinct forms have been confused together. The true *C. monoceros* is that described and figured by Busk, and also in the Zoology of Victoria. The zoecia are large, with large foramina, the margins of which are thickened. The mouth is large, and the lower lip raised into a central, pointed process. In some specimens there are no oral spines, while in others there is a single spine on one side, articulated close to the mouth, and really within the peristome when that is developed. There are occasionally two or three thin furcate spines on the upper margin of the mouth, and the lateral oral spine is sometimes similarly terminated. The avicularia are frequently wanting, or may be numerous and vary much. In some specimens they are scattered and small, close to the sides of the zoecia, with sharp mandibles, while in others they are very large, with large, acute or spatulate mandibles, or occasionally small with blunt mandibles. They are also found of small size, sessile on eminences round the mouth. A small avicularium is sometimes found surmounting the mucronate elevation of the lower lip.

Cribrilina acanthoceros, n. sp. Plate II., fig. 4.

Zoarium adherent. Zoecia with large foramina; mouth large, lower lip straight, with no mucro; a large spine, very long, and with sharp secondary spines or prickles directed forwards, articulated immediately below the lip and to one side; frequently a large avicularium, with triangular mandible at each side of the mouth towards the angle. Oecia sub-immersed, surface with a thickened band, above which it is marked with cribriform depressions similar in form to the foramina of the zoecia.

Port Phillip Heads; Portland, Mr. Maplestone.

This form differs from *C. monoceros*, chiefly in the following points:—The lower lip is always straight, and never developed into a mucro; the foramina are smaller, the oecium is somewhat different in its appearance, and especially in the situation of the oral spine. In *C. monoceros* it is always situated at one side of the mouth, close to the margin, above the angle, and is enclosed within the peristome

when one is developed. In *C. acanthoceros*, the spine, besides being very long, and furnished with the peculiar armature, is situated *below* the lower lip, and if a peristome should be developed (which I have never seen) would be outside it.

Family ESCHARIDÆ.

Porella formosa, n. sp. Plate II., fig. 6.

Zoarium encrusting or adnate. Zoecia pyriform or elongated, separated by distinct raised margins; surface with a row of large areolæ around the margin; primary mouth slightly hollowed below; secondary enclosing inferiorly an avicularium, with a nearly semicircular mandible resting on a pouch-like elevation of the zoecium; no internal denticle; a minute articular process on each side of the mouth for the attachment of the operculum. Oœcia large, galeate, prominent, margined by a thickened rim, and closely punctate.

Queenscliff.

Allied to *P. concinna*, but differing in the absence of an internal denticle and in the presence of a small articular process on each side of the mouth for the attachment of the operculum. This structure is not visible unless where the operculum has been detached or removed.

Schizoporella Woosteri, n. sp. Plate II., fig. 5.

Zoecia broad, subquadrate, separated by distinct raised margins, surface granulated; mouth suborbicular, with a wide, rounded sinus below. An avicularium, with semicircular mandible on each side of the mouth at the upper angles of the zoecia.

Queenscliff, Mr. Wooster.

Smittia calceolus, n. sp. Plate II., fig. 3.

Zoarium encrusting or adnate. Zoecia much elongated, narrow, separated by narrow (sometimes indistinct) raised lines; surface rough or granular, a row of deep, rounded areolations along the margins; mouth broadly triangular, the peristome much elevated and produced into a point on each side, leaving a narrow, spout-like channel below; a broad, hammer-shaped denticle internally; immediately below the mouth an avicularium with a long, narrow mandible directed straight downwards. Oœcia partly immersed in the cell above, elongated and rounded above, depressed across the middle portion, thickly punctate.

Port Phillip Heads, found by Mr. Wilson and myself.

In the structure of the zoecium this species precisely agrees with *S. reticulata*, but the oecium is totally different. Instead of being rounded and projecting, it is elongated upwards, partly immersed and depressed across the centre, giving it a very peculiar appearance, somewhat like that of the flower of the well-known calceolaria. The difference in the oecium is too great to admit of its being ranked merely as a variety of *S. reticulata*.

Family DISCOPORELLIDÆ.

Lichenopora bullata, n. sp. Plate III., fig. 2.

Zoarium encrusting, irregular; at intervals a minutely punctate or perforated thin calcareous membrane, raised in inflated eminences, covering a considerable number of cells. Zoecia irregular in shape and size; prismatic, with rounded angles; wall thick, with numerous internal, minute, sharp spines. The zoecia at the edges of the bullate elevations, with an elongated peristome on one side, spout-like or divided, directed towards the elevation; the zoecia underneath the inflations, with their orifices, closed by a minutely granular membrane.

Port Phillip Heads, Mr. J. B. Wilson.

This is a most interesting form. The inflations are pretty regular, large, raised high above the zoecia, and are evidently oecia. At their margins some of the zoecia are elongated, and pierce the edges. In these the side of the mouth is elongated in the direction of the centre of the inflation, the peristome being spout-like, sometimes dimidiate or with small lateral processes. The peristome of the other zoecia is occasionally irregularly produced. The zoecia under the inflations have their orifices closed by a minutely granular membrane.

As the generic name *Lichenopora* was proposed prior to that of *Discoporella*, it ought to be retained.

Lichenopora magnifica, n. sp. Plate III., fig. 3.

Zoarium encrusting, thick, raised into irregular mounds. Zoecia frequently closed by a membrane a short way down, either entire or with a circular aperture in the centre; orifice very irregular in size, usually oval, with the peristome

produced on one side into a thick, spout-like, nearly erect projection, or sometimes divided as in *L. pristis*. The zoecia in many parts arranged on slight elevations as radiating ridges from a depressed central portion. In the lower and intervening zoecia the peristome slightly developed, although often divided into two or three narrow processes; those on the ridges with the spout-like peristome large, entire or with small secondary processes on the sides, always pointing towards the central depression.

Port Phillip Heads, Mr. J. B. Wilson.

The specimen of this splendid species which I have examined spreads as an encrusting layer over a calcareous mass composed of cellopores and other polyzoa, and covers an extent of upwards of six inches. The whole is covered with large, irregular elevations, which are again nodulated. These large elevations are in part caused by the elevation of the calcareous zoophytal mass on which it grows, but several of the nodules having a diameter of a quarter of an inch or more, are entirely of this species, and in parts the continuous layer is of an equal thickness. As in other species, the zoarium extends by a basis, or lamina, in which the cells are developed. The individual zoecia are more allied to those of *Lichenopora* (*Discoporella*) *pristis* than to those of any other species. All over the surface are slight elevations, composed of radiating, raised series, spreading from a central elongated or rounded level part. The zoecia in the lower parts, between the rays and generally over the zoarium, either have the peristome not produced, or but slightly and divided into two or three sharp processes. Those on the ridges have it produced on one side into a stout, spout-like process directed towards the centre of the elevation. At first sight the numerous circular or oval elevations with radiating lines look as if the whole zoarium were formed by the coalescence of numerous small colonies, but it is not so, the margin being continuous.

Family DISCOPELLIDÆ.

Flosculipora, n. genus.

Zoarium small, pedunculate; the peduncle consisting of smooth tubes or ridges, with intervening cancelli towards the upper part. Zoecia opening on an expanded summit; peristome produced, dimidiate or lacerated, with numerous intervening cancelli.

F. pygmæa, n. sp. Plate III., fig. 1.

This exquisite little species forms single tufts about 1-12th of an inch high, like miniature bouquets, growing on the cells of catenicellæ. The stem is composed of highly polished tubes, close together below, but distinct, and separated by rows of cancelli above. The zoecia are, on the edges of the capitulum, arranged in converging rows separated by cancelli; the peristome is produced, and usually dimidiate, or extended only on one side; towards the centre of the head the peristome is wanting or represented by a small spinous process, and the cancelli are only distinguished by their smaller size.

Port Phillip Heads, Mr. J. B. Wilson.

EXPLANATION OF FIGURES.

PLATE I.

- Fig. 1. *Catenicella gemella*.
- Fig. 2. *Claviporella pulchra*.
- Fig. 3. *C. imperforata*, showing two sorts of oecia.
- Fig. 4. *C. aurita*, specimen with only single central foramen.
- Fig. 5. *C. aurita*, showing enormously developed lateral processes.

PLATE II.

- Fig. 1. *Thairopora Jervoisii*.
- Fig. 2. *Amphiblestrum bursarium*.
- Fig. 3. *Smittia calceolus*.
- Fig. 4. *Cribrilina acanthoceros*.
- Fig. 5. *Schizoporella Woosteri*.
- Fig. 6. *Porella formosa*.

PLATE III.

- Fig. 1. *Flosculipora pygmæa*.
- Fig. 2. *Lichenopora bullata*, natural size. Fig. 2a, portion of same, showing a broken oecium, magnified. Fig. 2b and 2c, other zoecia from the same.
- Fig. 3. *Lichenopora magnifica*, small portion natural size. Fig. 3a, part of same magnified, showing portions of two radiating ridges and intervening surface.